

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

## PCT

To:

Raybaud, Hélène  
Etudes & Productions Schlumberger  
Intellectual Property Law Dept  
1, rue Henri Becquerel  
B P 202  
F-92142 Clamart Cedex  
FRANCE

### NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing  
(day/month/year)

03.02.2005

Applicant's or agent's file reference  
101.0083

### IMPORTANT NOTIFICATION

International application No.  
PCT/GB 03/03785

International filing date (day/month/year)  
29.08.2003

Priority date (day/month/year)  
30.08.2002

Applicant  
SENSOR HIGHWAY LIMITED

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

#### 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international  
preliminary examining authority:



European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl  
Fax: +31 70 340 - 3016

Authorized Officer

Ter Haar, H

Tel. +31 70 340-3817



INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

Rec'd PCT/PTO 24 FEB 2005



REC'D 02 FEB 2005

WIPO PCT

Applicant's or agent's file reference 101.0083	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/03785	International filing date (day/month/year) 29.08.2003	Priority date (day/month/year) 30.08.2002
International Patent Classification (IPC) or both national classification and IPC E21B47/12		
Applicant SENSOR HIGHWAY LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.  
  
☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).  
  
 These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:
  - I ☒ Basis of the opinion
  - II ☐ Priority
  - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☒ Lack of unity of invention
  - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI ☐ Certain documents cited
  - VII ☐ Certain defects in the international application
  - VIII ☐ Certain observations on the international application

Date of submission of the demand  22.03.2004	Date of completion of this report  03.02.2005
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Weiland, T  Telephone No. +31 70 340-3204  

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB 03/03785

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-21 as originally filed

**Claims, Numbers**

1-116, 121-138 as originally filed

117-120 filed with telefax on 18.01.2005

**Drawings, Sheets**

1/10-10/10 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**BEST AVAILABLE COPY**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB 03/03785

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,  
☒ claims Nos. 2-63,91-116,129-133,134-138

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):  
☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):  
☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.  
☒ no international search report has been established for the said claims Nos. 2-63,91-116,129-133,134-138

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- ☐ the written form has not been furnished or does not comply with the Standard.  
☐ the computer readable form has not been furnished or does not comply with the Standard.

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.  
☒ paid additional fees.  
☐ paid additional fees under protest.  
☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/GB 03/03785**

☒ not complied with for the following reasons:

**see separate sheet**

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☐ all parts.

☒ the parts relating to claims Nos. 64-76,117-120,77-89,122-128 .

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	77-89,119,120,122-128
	No: Claims	64-67,71,117,118
Inventive step (IS)	Yes: Claims	77-89,119,120,122-128
	No: Claims	64-67,71,117,118
Industrial applicability (IA)	Yes: Claims	64-76,117-120,77-89,122-128
	No: Claims	

2. Citations and explanations

**see separate sheet**

**Re Item IV**

**Lack of unity of invention**

This IPEA found multiple groups of inventions as follows:

1. Claims 1-63, 90-116

A system and method for logging with a fibre optic line connected to a fibre optic sensor.

2. Claims 64-76, 117-120

A flow sensor and method.

3. Claims 77-89, 122-128

A casing collar locator and method.

4. Claims 129-133

Combination of a conduit and a fibre optic line and method.

5. Claims 134-138

A combination of a fibre optic line and a device or a tool.

The only common concept between the independent claims of the subjects 1-5 as defined above is: a fibre optic line in optical communication with a fibre optic device that will make communication possible between the surface and the device(sensor or tool etc). This common concept is known from WO-A-02057805 (see paragraph 50 to 56, figures 1,4) and can thus not be the inventive concept linking the inventions as required by Rule 13.1 PCT.

The potential inventive concept of subject 2 is measuring flow with optical lines; the one of subject 3 is locating casing collars with optical lines; the one of subject 4 is to actuate and signal at the same time; the one of subject 5 is to control tools or devices via optical lines. Since these concepts are clearly different, the five inventions are not linked by a single inventive concept and the application does not fulfill the requirements of unity of invention as required by Rule 13.1 PCT.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/03785

Two additional search fees have been paid, for subjects 2 and 3 (see applicants fax of 5 March 2004). Taking into account also the claims that were found unsearchable, the search covered claims 1,90; 64-76, 117-121; 77-89, 122-128. These claims can be subject to an IPER once two additional preliminary examination fees have been paid.

In case the applicant prefers not to pay the additional fees and to restrict the application instead, one possible way for such a restriction could be the deletion of the respective claims. In the absence of any response from the applicant, the international preliminary examination report will be established on the basis of claims 1 and 90, which claims appear to relate to the main invention

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

D4: JP 08 165879 A (CENTRAL RES INST OF ELECTRIC POWER IND; SAKATA DENKI KK) 25 June 1996 (1996-06-25)

D5: US-A-4 345 480 (BASHAM EDWARD R ET AL) 24 August 1982 (1982-08-24)

D6: US-A-5 388 466 (TEUNISSEN THEODORA A) 14 February 1995 (1995-02-14)

D9: US-B-6 431 2701 (ANGLE COLIN M) 13 August 2002 (2002-08-13)

2. **Group 2 (claims 64-76 and 117-120)**

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 64-67, 71, 117-118 is not new in the sense of Article 33(2) PCT.

2.1 Document D4 discloses (see figures) a fibre optic flow sensor adapted to be disposed in a wellbore, comprising: a fibre optic line (12,15) carrying an optical signal; a spinner (34) adapted to spin when in contact with fluids flowing through the wellbore; and a modulator (33) functionally connected to the spinner, the modulator modulating the optical signal depending on the spinning of the spinner. (claim 64).

It should be noted that the modulator of D4 is a slit disk (33), which will modulate the

optical signal by letting it pass or blocking it off.

The same document also discloses the features of claims 65-67,71 and newly filed claims 117-118.

- 2.3 Dependent claims 68-70,72 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see documents D5 and D6 and the corresponding passages cited in the search report.
- 2.4 Newly filed claim 119 is considered new and inventive, as no prior art discloses or fairly suggests that the modulation step comprises imparting a strain on the fibre optic line. Claim 119 is thus new and inventive. Dependent claim 120 is new and inventive accordingly.
3. **Group 3 (claims 77-89 and 122-128)**
- 3.1 The document D9 is regarded as being the closest prior art to the subject-matter of claim 77, and discloses (the references in parentheses applying to this document): (see col.7, line 50 - col.8, line 19) a casing collar locator adapted to detect casing collars disposed in a wellbore, comprising as one alternative a fibre optic line carrying an optical signal.

The subject-matter of claim 77 therefore differs from this known casing collar locator in that the locator is specified to be a magnetic device adapted to become magnetically connected to a casing collar as the magnetic device passes the casing collar; a modulator that is functionally connected to the magnetic device; wherein the optical signal is modulated by the modulator when the magnetic device passes the casing collar. Claim 77 is thus new.

The problem to be solved by the present invention may therefore be regarded as finding an alternative to the casing collar locator of D9.

The solution proposed in claim 77 of the present application is inventive as no prior art suggests the combination of the optical signal being modulated as a result of the magnetic device being magnetically connected when passing a collar.



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

---

International application No. PCT/GB 03/03785

The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 122, which therefore is also considered new and inventive.

117. A method to calculate the flow of fluid within a wellbore, comprising:

- providing a spinner adapted to spin when in contact with fluids flowing through the wellbore;
- and modulating an optical signal transmitted through a fiber optic line depending on the spinning of the spinner wherein said modulation step comprises aligning a modulator with the fiber optic line once every revolution of the spinner.

118. The method of claim 117, further comprising determining the velocity of the wellbore fluids based on the frequency of modulations.

119. A method to calculate the flow of fluid within a wellbore, comprising:

- providing a spinner adapted to spin when in contact with fluids flowing through the wellbore;
- and modulating an optical signal transmitted through a fiber optic line depending on the spinning of the spinner wherein said modulation step comprises imparting a strain on the fiber optic line.

120. The method of claim 119, wherein the imparting step comprises:

- creating a magnetic connection related to the revolution of the spinner; and
- generating a voltage that causes a piezoelectric material mechanically coupled to the fiber optic line to constrict and strain the fiber optic line.